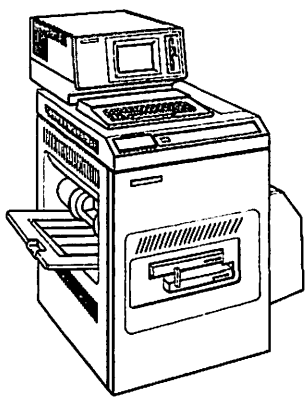
Rank Xerox 3700

Distributed Electronic
Printing System

GOVERNMENT BRANCH

INTRODUCTION



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Printed on the Xerox 3700 Distributed Electronic Printing System

Development of Xerox Electronic Printing

The Xerox Electronic Printing business evolved from the introduction of the Xerox 1200 computer printing system in 1973 (US only). The 1200 emerged as a result of Xerox engineers looking for markets that did not involve light-lens xerography, the imaging system used in traditional copiers and duplicators.

The 1200 was the first electronic printer offered by Xerox that combined xerographic and digital technologies by using an optical system that flashes individual characters on a drum. At a page a second, the 1200 was twice as fast as standard impact printers then available. The 1200 eliminated the need for the wide computer forms by printing everything neatly on 8.5 x 11 inch (US equivalent to A4) paper. Forms with customised headings, logos and key points could be printed at the same time as information that was being fed from the host computer. There are many 1200's still in use, producing volumes of 200,000 to 500,000 per month.

Building on the basic Xerox strengths in imaging, electronics and xerography, as well as what had been learned with the 1200, the Xerox 9700 Electronic Printing System was unveiled in the Spring of 1977. The first UK trials were started in 1979 prior to launch in 1980. With this new printer, Xerox combined several technologies: digital computers, with their capacity for high speed handling of information: lasers, with their high resolution imaging qualities: and xerography, with its ability to produce high-quality printed output.

Data processing was the initial market for the 9700 Electronic Printing System for the folowing reasons:

- **High volume output requirements**
- **Limitations of line printers**
  - **Quality**
  - **Restricted type fonts and formatting capability**
  - **Fanfold paper - oversized and costly**
  - **Labour intensive post printing requirements**
- **Management and end-user pressure on data processing organisations for more responsive turnround, and better quality of reports**

The 9700 has exceeded the standards set by its predecessor and is firmly established as the industry leader. At two pages per second, it is twice as fast as the 1200. The 9700 generates data to be entered on forms electronically, and instead of using the 1200's forms transparency overlay, it generates the actual form data simultaneously. On one page, up to 16 typestyles can be used, of varying sizes, compared with the 1200's single typeface and limited size. With the 9700's two input and two output trays, continuous operation can be achieved.

The 9700 also prints logos, signatures and graphics. These can be printed at any point on a page.

Printed on the Xerox 3700 Distributed Electronic Printing System

Devolopment of Xerox Electronic Printing

Although the 9700 was developed as a high-volume, high-quality printer for computer installations, it has also found a place in other printing environments. Insurance companies find they can produce personalised policies faster than manually assembling them from pre-printed forms. Large retail chains find the 9700 ideal for preparing weekly stock lists and bar coded labels. Many businesses have found that faster turnaround of price change documentation enables them to realize substantial results in improving productivity and controlling costs. Direct mail agencies find that the multi-font capability of the 9700 allows greater creativity when designing sales literature.

In March 1982 Xerox introduced the 8700 Electronic Printing System. The 8700 is fully compatible with the 9700 and can print up to 70 pages per minute. Smaller data procesing departments that do not have the volume requirements of the 9700, or those with a specific application, use the 8700.

The first of the decentralised range, the Xerox 2700 Distributed Electronic Printer was also announced in 1982. The 2700 is a general all-purpose data and text printer used to facilitate remote printing requirements from a host computer or network. The 2700 is also commonly used as a 'system printer' in smaller data processing departments operating mini-computers rather than mainframe computers. The 2700 has the versatility to operate either as a lineprinter for traditional DP output, or as a high quality printer for printing company correspondance. The 2700 was voted **Printer of the Year** in the US in 1983.

One of the greatest advantages of the Xerox range of Electronic Printers is that it reduces the number of steps required to produce a complete document. The following table illustrates the four steps in Electronic Printing compared to the six steps in impact printing and the fourteen steps required in offset printing.

ELECTRONIC	**IMPACT**	**OFFSET**
Data Input	Data Input	Data Input
Compose	Print	Compose
Print	Decollate	Typeset
Output	Burst	Proof
	Collate	Make-up
	Output	Make Negative
		Opaque
		Strip Negative
		Plate
		Proof
		Setup
		Print
		Collate
		Output

Development of Xerox Electronic Printing

What started out twelve years ago as a computer-room printer has evolved into the quietest, easiest and fastest method of getting high quality output from a computer onto paper.

On 30th April 1985, Xerox introduced a new Electronic Printer. It is called the Xerox 3700 Distributed Electronic Printing System. The 3700 has been introduced to provide an upward compatible product to the Xerox 2700 Distributed Electronic Printer. Any job that has been designed to run on the 2700 will run on the 3700. With a speed of up to 24 pages per minute and an anticipated average printing volume of between 30,000 and 50,000 pages per month, increased paper capacity and A3 printing capability, the 3700 is positioned between the 2700 and the 8700 Electronic Printing System.

The 3700 fulfills the need for a medium speed decentralised printer in the Xerox electronic printing family, providing high quality, flexible and affordable laser printing to new segments of the decentralised market. In addition, the 3700 can be placed as a central printer in data processing departments or specialised departments running mini computers or small business computers.

Printed on the Xerox 3700 Distributed Electronic Printing System

3700 Overview

The 3700 consists of an Electronic Subsystem (ESS) and a laser xerographic element, the Image Output Terminal (IOT). The IOT is a derivative of the subsystem used in the 2700, XP-12, XP-12E and 8044. There are currently more than 8,000 of these printing subsystems installed throughout the Xerox marketplace.

The 3700, in common with all Xerox Electronic Printing products, has a resolution of 300 x 300 spots per inch. Printing is simplex (one side) on cut sheet paper from 4 sources: two cassettes of 250 sheets each, a high capacity main feeder holding 1500 sheets and an A3 auxiliary input tray holding up to 250 sheets. Prints are delivered face down in correct order to a stacker with two position offset.

Key Features

- **Speed - up to 24 pages per minute**
- **Variety of interface options**
- **Rigid disk allowing for :**
  - **Form storage - forms called dynamically**
  - **Font storage - fonts loaded once only**
  - **Job spooling - multiple copies**
- **Two orientations on same page**
- **2700 compatability**

System Components - ESS

The ESS is a separate unit from the IOT, and is composed of a low profile keyboard, ESS body and a 7 inch CRT display. Enclosed within the body of the ESS are a Winchester disk drive, image generator, system interface boards and a floppy diskette drive. The ESS may be mounted on the top of the IOT or alternatively may be placed up to 5 feet from the IOT.

The ESS contains the resource for :

- Interfacing with the host computer
- Buffering and organising data to be printed
- Storing the forms and fonts library
- Generating the bit-map delivered to the IOT
- System control and error recovery
- Self monitoring diagnostic tests

3700 Overview

Three interface boards are available for the ESS to support input of host data. Available at announcement is the General Purpose Interface, which supports serial (Async or Bisync) or parallel (Centronics 100 or Data-products 2260) interfaces. These are the same as supported by the Xerox 2700 Distributed Electronic Printer. The other two interface boards will support Ethernet and IBM SNA/SDLC. SNA interfacing is currently supported by the RX274 and RX271 Protocol Converters, both of which output in parallel Centronics format.

System Components - IOT

The 3700 IOT is very similar in appearance to the 2700. The major visible difference is the addition of a sheet elevator paper feeder on the side of the unit. The Raster Output Scanner (ROS) uses a Helium-Neon laser, and the unit has a radiant fuser.

The IOT is controlled by a microprocessor which generates all IOT timing, monitors internal conditions, controls toner dispensing and provides all logical functions for the machine.

3700 Interface Specifications

There are individual source data modules for each interface type : parallel, serial asynchronous and serial bisynchronous. The source data module's two major tasks are the management of interface protocols and page composition.

Interface Processing

The 3700 collects data through any one of its parallel or serial ports. A variety of communications protocols are supported as well as several device emulation modes. Selectable configuration options are available depending on the type of interface installed: all may be selected by the means of the keyboard and screen. Available options are summarized in the following table.

Parallel	**Serial Asynchronous**	**Serial Bisynchronous**
Centronics	No device	2770, 2780
Dataproducts	Emulation	2780 MR, 3780
Character set	Character set	Character set
Line ending	Line ending	Parity
Logic level	Code reassignment	Line type
VFU	Baud rate	Page offset on EOT
Data bit 8 (DP)	Protocols	Code reassignment
Code reassignment	Interface signals	
	Line type	
	Parity	
	Stop bits	
	Auto disconnect	

Encoding and data types

ASCII, ISO and EBCDIC coding schemes are supported. ASCII and EBCDIC codes are translated upon receipt to their corresponding ISO code assignments according to the language mapping selected at the menu screen, or by command. Besides communication and protocol control codes, the 3700 distinguishes among three clases of data

- **Text data to be printed**
- **Forms to be stored on the rigid disk or merged with textual data**
- **Font, Logo or Signature data**

All received codes other than control codes (those below X'20' in ASCII and X'40' in EBCDIC) are assumed to be text data unless the appropriate data-type command (3700 control language) is inserted into the data stream. A summary of those electronic printing commands is the last section of this introduction.

3700 Features, Functions and Benefits

It is important to understand and appreciate the benefits of Electronic Printing in general, as well as the features of one particular machine. The following section describes many of the important features of the 3700, their function and most important of all, the benefits gained as a result of the feature.

High Output Speed

Speed is one of the significant advantages that the 3700 printer offers over other conventional means of printing.

Feature	Function	Benefit
Speeds up to 24 pages per min	At 24 pages per min. speed is equal to a 1200 lpm lineprinter, and is many times faster than daisywheel	Makes information available sooner at the point of need. Eliminates the need for two printers - volume and quality

High Quality and Flexible Page Appearance

The Xerox 3700 offers the unequalled quality of laser printing. With 300 x 300 spots per inch (90,000 per square inch), clear crisp and consistent character density is standard. The 3700 offers more flexibility than a dot matrix or band printer with its full electronic page make-up capability.

Feature	Function	Benefit
300 x 300 spi	Quality Printing	Report legibility Enchance image
6 - 24 point fonts	Flexible appearance	Visual impact Easier to read Typesetting savings
Portrait or Landscape printing	Supports data and text printing	Save stationery costs Use existing office stationery

Features, Functions and Benefits

High Quality and Flexible Page Appearance (Cont)

Feature	Function	Benefit
Command Language	Page Formatting	Bolding, justifying, centering, overstrike sub and superscript, underlining and line drawing available to users

Convenience of Use

One of the attractive features of all Xerox Distributed Electronic Printers is their office styling. The 3700 is small, quiet in operation and convenient for office personnel to use. In addition, when placed in a traditional Data Processing environment printing normal computer output close to the host computer, it has been readily accepted by DP trained staff.

Feature	Function	Benefit
Load/unload while printing	Continous operation	Saves print time
Office size	Fits with normal furniture	No special requirements to locate
Office quiet	Low noise level	Located with users
		No acoustical device required
Audible tone	Indicates attention required	Avoid delays
Collated output	Reports ready for distribution	Minimal post-printing handling

Fonts

A font may be defined to be a set of images, usually characters and symbols, having common visual characteristics such as style, width, height and weight.

A digital font contains a bit-map for each character or symbol represented in the font. In their electronic form, printed dots are represented by ones in the bit-map, unprinted dots - or white space - by zeroes. The binary bit-maps of all the characters for a given font are created at the Xerox Corporate Font Center and distributed for use on the 3700 as digitized fonts on magnetic tape or floppy diskettes.

Digital fonts which are stored on magnetic tape are loaded into the host computer and "downloaded" to the 3700, where they are stored on the rigid disk. Fonts supplied on floppy diskette are loaded to the rigid disk via the Systems Utilities available on the 3700.

Fonts for the 3700 fall into 6 categories :

- **Office - Fixed Pitch Applications**
- **Office - Proportional Applicatins**
- **Typographic Applications**
- **Computer Output Printing**
- **Special Applications**
- **Graphic Applications**

Fixed pitch fonts for the 3700 are those where every character within the font is the same width. This width is referred to as the 'pitch' of the font. The pitches available are 10, 12 or 15. Fixed pitch fonts may also be called Monospaced. Proportional fonts are those where each character in the font is a different width. This text is printed using such a font style and it can be seen that the 'i' takes up less space than, say, the 'w'. Proportional fonts are measured in 'point size', which is the height of the character rather than the width. The Xerox Typographical fonts are proportional and are supplied in 6, 8, 10, 12 and 14 point sizes. Most font can be digitized by the Xerox Font Center, providing size for size artwork (camera ready copy) is supplied.

Command Summary

NAME OF COMMAND	FORMAT	PURPOSE
Surrogate Escape Character	=**UDK**=(character)	Assign escape code function to additional character
Job Control Commands		
Start Print Job	(Esc)+**P**,(LE)	One orientation on page
Print Mixed Orientations	(Esc)+**Q**,(LE)	Mixed orientation on page
Font Load	(Esc)+**F**,(LE)	Start of font data
Font Add	(Esc)+**A**,(LE)	Load single font
Multiple Copies	(Esc)+**Cn**,(LE)	Print multiple copies
Merge-page Load	(Esc)+**M**,(LE)	Store constant page data
Merge-page Unload	(Esc)+**V**,(LE)	Erase constant page data
Reset	(Esc)+**X**,(LE)	Reset
Data Control Commands		
Font ID Assignment	(Esc)+**n**(font-name)(LE)	Assign index to font
Form Load	(Esc)+**N**(form-name)(LE)	Store permanent form
Form ID assignment	(Esc)+**n**(form-name.FRM)(LE)	Assign index to form
Form Start	(Esc)**zbn**	Invoke form 'n'
Form Stop	(Esc)**zhn**	Cancel form 'n'
Merge Start	(Esc)**ze**	Merge constant page
Merge Stop	(Esc)**zd**	Cancel constant page
Data Monitor	(Esc)+**D**	Invoke hex printing
Language	(Esc)**zl**L	Invoke language mapping
Print Position		
Units - 1/60th	(Esc)**zg**	Set units as 1/60th
Units - 1/300th	(Esc)**zf**	Set units as 1/300th
Margins	(Esc)**mp**,t,b,l,r(LE)	Set page dimensions
Horizontal Tab Set	(Esc)**t**n1,n2, . .n8(LE)	Assign horizontal tabs
Line Tabs (Bisync only)	(Esc)(HT)c1,c2, . . c132(LE)	Assign tabs based on character widths

Command Summary

Horizontal Tab Clear	(Esc)**d**	Erase horizontal tabs
Vertical Tab Set	(Esc)**v**n1,n2, . .n8(LE)	Assign absolute positions
Vertical Tab Clear	(Esc)**e**	Erase vertical tabs
VFC Stops Set	(Esc)**z**vn1,n2, . .n8(LE)	Vertical Format Control (DP)
VFC Stops Clear	(Esc)**zw**	Clear to 00 value
Channel Select(Bisync)	(Esc)**C**	Select line number
Channel Stops(Bisync)	(Esc)**z**vn1,n2, . .n8(LE)	Assign channel stops
Absolute Text Placement	(Esc)**a**x,y(LE)	Assign specific print position
Relative Text Placement	(Esc)**r**Cd(character)	Print relative to current
Absolute Line Spacing	(Esc)**ip**n(LE)	Assign pixels between lines
Font-based Line Spacing	(Esc)**i**n	Assign multiple of font
Draw Line	(Esc)**x**d,i,l,w,s(LE) (Esc)**y**d,i,l,w,s(LE)	Line parallel to x axis Line parallel to y axis
Ink Change	(Esc)**z**in	Select black, white or grey
Font Change	(Esc)**n**	Invoke font 'n'
Underline	Start: (Esc)**u** Stop: (Esc)**w**	Invoke underlining Stop underlining
Justification	Start: (Esc)**j** Stop:(Esc)**k**	Invoke justification Cancel justification
Justification - Unlimited	(Esc)**z**j	Invoke unlimited justification
Superscript	(Esc)**h**	Invoke superscripting
Subscript	(Esc)**l**	Invoke subscripting
Stop Super/Subscript	(Esc)**s**	Cancel super/subscript
Centering	(Esc)**q**	Centre text
Bolding	Start: (Esc)**b** Stop: (Esc)**p**	Invoke bolding Cancel bolding
Overstriking	Start: (Esc)p̃C Stop: (Esc)	Invoke overstriking Cancel overstriking
Printer Control		
Paper Tray Selection	(Esc)**c**n	Select paper tray
Offset Output	(Esc)**o**	Invoke offset stacking

he rigid
~kdisk via the Systems Utilities available on the 3700.

Fonts for the 3700 fall into 6 categories:

~bo Office - Fixed Pitch Applications

o Office - Proportional Applicatins

o Typographic Applications

o Computer Output Printing

o Special Applications

o Graphic Applications~p
~1~zj
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~a300,165
~4Printed on the Xerox 3700 Distributed Electronic Printing System
~m700,30,30,75,420

~2~uCommand Summary~w

~b~1~uNAME OF COMMAND~w

~pSurrogate Escape Character

~bJob Control Commands

~pStart Print Job

Print Mixed Orientations

Font Load

Font Add

Multiple Copies

Merge-page Load

Merge-page Unload

Reset

~bData Control Commands

~pFont ID Assignment

Form Load

Form ID assignment

Form Start

Form Stop

Merge Start

Merge Stop

Data Monitor

Language

^bPrint Position^p

Units - 1/60th

Units - 1/300th

Margins

Horizontal Tab Set

Line Tabs (Bisync only)
^m700,30,30,201,420
^a1005,3120

^b^uFORMAT^w^p

^b=UDK^1=(^pcharacter)

(Esc)^b+P,^p(LE)

(Esc)^b+Q,^p(LE)

(Esc)^b+F,^p(LE)

(Esc)^b+A,^p(LE)

(Esc)^b+Cn,^p(LE)

(Esc)^b+M,^p(LE)

(Esc)^b+V,^p(LE)

(Esc)^b+X,^p(LE)

(Esc)^b+n^p(font-name)(LE)

(Esc)^b+N^p(form-name)(LE)

(Esc)^b+n^p(form-name.FRM)(LE)

(Esc)^bzb^pn

(Esc)^bzh^pn

(Esc)^bze^p

(Esc)^bzd^p

(Esc)^b+D^p

(Esc)^bzl^pL

(Esc)^bzg^p

(Esc)^bzf^p

(Esc)^bm^pp,t,b,l,r(LE)

(Esc)^bt^pn1,n2,..n8(LE)

(Esc)(HT)c1,c2,..c132(LE)
^m700,30,30,327,450
^a1635,3120

^b^uPURPOSE^w^p

Assign escape code function to additional character

One orientation on page

Mixed orientation on page

Start of font data

Load single font

Print multiple copies

Store constant page data

Erase constant page data

Reset

Assign index to font

Store permanent form

Assign index to form

Invoke form 'n'

Cancel form 'n'

Merge constant page

Cancel constant page

Invoke hex printing

Invoke language mapping

Set units as 1/60th

Set units as 1/300th

Set page dimensions

Assign horizontal tabs

Assign tabs based on
character widths
~a300,165
~4Printed on the Xerox 3700 Distributed Electronic Printing System
~m700,30,30,75,420

~2~uCommand Summary~w
~1

Horizontal Tab Clear

Vertical Tab Set

Vertical Tab Clear

VFC Stops Set

VFC Stops Clear

Channel Select(Bisync)

Channel Stops(Bisync)

Absolute Text Placement

Relative Text Placement

Absolute Line Spacing

Font-based Line Spacing

Draw Line

Ink Change

Font Change

Underline

Justification

Justification - Unlimited

Superscript

Subscript

Stop Super/Subscript

Centering

Bolding

Overstriking

~bPrinter Control~p

Paper Tray Selection

Offset Output
^m700,30,30,201,420
^a1005,3140

(Esc)^bd^p

(Esc)^bv^pn1,n2,..n8(LE)

(Esc)^be^p

(Esc)^bzv^pn1,n2,..n8(LE)

(Esc)^bzw^p

(Esc)^bC^p

(Esc)^bzv^pn1,n2,..n8(LE)

(Esc)^ba^px,y(LE)

(Esc)^br^pCd(character)

(Esc)^bip^pn(LE)

(Esc)^bi^pn

(Esc)^bx^pd,i,l,w,s(LE)
(Esc)^by^pd,i,l,w,s(LE)

(Esc)^bzi^pn

(Esc)^bn^p

Start: (Esc)^bu^p
Stop: (Esc)^bw^p

Start: (Esc)^bj^p
Stop:(Esc)^bk^p

(Esc)^bzj^p

(Esc)^bh^p

(Esc)^bl^p

(Esc)^bs^p

(Esc)^bq^p

Start: (Esc)^bb^p
Stop: (Esc)^bp^p

Start: (Esc)^bzo^pC
Stop: (Esc)^bzp^p

(Esc)^bc^pn

(Esc)^bo^p
^m700,30,30,327,450
^a1635,3140

Erase horizontal tabs

Assign absolute positions

Erase vertical tabs

Vertical Format Control (DP)

Clear to 00 value

Select line number

Assign channel stops

Assign specific print position

Print relative to current

Assign pixels between lines

Assign multiple of font

Line parallel to x axis
Line parallel to y axis

Select black, white or grey

Invoke font 'n'

Invoke underlining
Stop underlining

Invoke justification
Cancel justification

Invoke unlimited justification

Invoke superscripting

Invoke subscripting

Cancel super/subscript

Centre text

Invoke bolding
Cancel bolding

Invoke overstriking
Cancel overstriking

Select paper tray

Invoke offset stacking
~a300,165
~4Printed on the Xerox 3700 Distributed Electronic Printing System
~+X